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Research Paper

# Comparison of Effect of Implementation of "Code 247" on Function of Emergency Ward Staffs in Patients With Acute Myocardial Infarction During Office and Non-Office Hours

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Code 247, Acute myocardial infarction, Emergency department

## ABSTRACT

**Background** Hospitals can improve outcome of treatment in acute myocardial infarction patients by adopting various strategies to reduce reperfusion time in coronary arteries.

**Objective** this study evaluated effect of implementation of "code 247" on performance of emergency department Staffs in patients with acute myocardial infarction during Office and non-office hours.

**Methods** This quasi-experimental study was conducted at Booali Hospital in Qazvin in 2017-2018. 58 patients with mean age of 58.3±12.3 years were entered into the available sampling method and were assigned to control and test groups based on their referral period. In control group, patients were routinely managed. In the test group, a "code 247" with six-person, was first designed in emergency department. When a patient with chest pain transmitting, code members were called by the page system to get the patient to Cath lab, as soon as possible. The researcher directly observed and recorded the time taken from hospital door to Cath lab, including the taking ECG, diagnosis and transmission. Data were analyzed by chi-square and Mann-Whitney tests.

**Findings** Average time from door to Cath lab was 87.4 minutes in control group and 63.7 minutes in test group. Comparison of time in two groups was statistically significant (P=0.04). There was also a significant difference between the "door to Cath lab" time in office hours between the two groups (P=0.02).

**Conclusion** This study showed that the implementation of "Code 247" improves the function of emergency personnel in patients with acute myocardial infarction.

## Extended Abstract

### 1. Introduction

Chest pain is the main cause of admission to the Emergency Department (ED)and hospitalization [1]. Coronary artery disease in the developing countries of the Persian Gulf region is an epidemic where younger people are more affected [2]. Among the Middle East countries, Iran is likely to have the highest incidence of ischemic heart disease [3]. A Myocardial Infarction (MI) associated with ST segment elevation on the Electrocardiogram (ECG) is called ST-Elevation Myocardial Infarction (STEMI). STEMI is triggered due to the complete blockage of the major coronary artery by the blood clot. This complication is the most severe manifestation of acute coronary syndromes and a life-threatening condition [4].

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Both delayed diagnosis and vital actions for patients with MI increase the odds of severe complications. Therefore, the reopening of the affected vein should begin at the soonest possible. The best proven treatment for these patients is to open the artery by angioplasty and the insertion of a stent [5-7]. Due to the lower risk of intracranial hemorrhage, this method has less mortality rate than fibrinolytic drug administration [8]. The reperfusion time is usually determined by measuring the interval that starts with the patient's arrival in the ED, and ends when the balloon is dilated in the patient's coronary artery which is called "Door-to-Balloon" (DTB) time [1].

Reduction of this time reduces the severity of myocardial damage and improves treatment outcomes [9]. Guidelines have recommended a DTB time of <90 min for 75% of the referral cases [10, 11]. The DTB time can be indicative of how the emergency department acts in managing patients with acute myocardial infarction.

## 2. Methods and Materials

This quasi-experimental study was conducted in 2017-2018 at Booali Sina Hospital in Qazvin City, Iran. We compared the effect of "code 247" implementation on the performance of ED staff in managing patients suffering from acute MI in office and non-office hours. Study population consisted of all patients with acute MI referring to the ED during the two pre- and post-implementation periods by the pre-hospital emergency system. The diagnosis of acute MI was confirmed by a cardiologist. Sampling was conducted using convenience sampling method. In total, 58 patients were selected and divided into two groups of the test (n=29) and control (n=29). The research team conducted a direct observation for measuring the time before and after code implementation. The DTB was divided into three time segments: 1. Door-to-ECG; 2. ECG-to-diagnosis; and 3. Diagnosis-to-Cath lab.

## 3. Results

The mean DTB time in the control group was 87 min and in the test group, it was 63.8 min. The comparison of DTB time suggested a significant difference between the groups (P=0.04) (Table 1). Code 247 implementation reduced the DTB time in the test group up to 41.3 min, compared to the control group in office hours, and the reduction was statistically significant (P=0.02). The mean DTB time in non-office hours also reduced up to 14.5 min; however, it was not statistically significant (P=0.36) (Table 1).

## 4. Conclusion

The obtained data revealed that the implementation of code 247 reduced DTB time. The DTB can be considered as an indicator of ED performance in managing patients with acute MI. Thus, the implementation of code 247 has improved the performance of ED in all working hours. In addition, it significantly reduced time to detect acute MI and patients transference to the Cath lab. Moreover, failure to properly triage and diagnose STEMI causes greatest delay in DTB time. This is in agreement with the findings of previous studies.

Consistent with the results of Pournorouz Ghadi et al., it was also found that the ECG-to-diagnosis time was far from the global standards. In line with the study of Eskandari et al. the obtained results indicated the positive effect of setting up a rapid response nursing team. Finally, the implementation of code 247 in hospitals can prevent parallel working and avoid the wasting of the time in healthcare staff and leads to more coherent and purposeful performance in them.

With shorter DTB time, the occupancy time of emergency beds is also reduced. This provides the ability to serve more patients and subsequently, reducing the stay of patients and their anxious companions in the ED. It eventually leads to a faster return of peace to the ED. This can potentially increase overall satisfaction. Furthermore, by shortening the

**Table 1.** The comparison of DTB time between the groups during office and non-office hours

| Reception Hours | Group | Mean±SD | Mann-Whitney Test (P) | Mean±SD | Mann-Whitney Test |
|---|---|---|---|---|---|
| Non-office | Test | 71.28±7.9 | 0.36 | 78.32±3.1 | P≤0.05 |
| | Control | 85.7±34 | | | |
| Office | Test | 49.20±1.7 | 0.02 | 70.49±4.5 | P≤0.05 |
| | Control | 90.57±2.8 | | | |

reperfusion time, the mortality rate, the number of hospital admissions in one year after the heart attack, and disability in patients could be reduced. At a wider level, it can be effective in reducing social damages caused by the inability of the family head, considering that code 247 implementation does not impose any additional costs.

## Ethical Considerations

### Compliance with ethical guidelines

This study was approved by the Ethics Committee of Qazvin University of Medical Sciences (Code: IR.QUMS.REC.1396.65) and has received the code IRCT20171210037814N1 from Iranian Registry of Clinical Trials.

### Funding

The present paper was extracted from the MSc. thesis of the second author, in Department of Critical Care Nursing, Faculty of Nursing and Midwifery, Qazvin University of Medical Sciences.

### Authors' contributions

Conceptualization, supervision, project management: Leili Yekefallah, Peyman Namdar; Statistical analysis: Ameneh Barikani; and Drafting, researching, implementing, editing and finalizing: Fateme Jalalian.

### Conflict of interest

The authors declared no conflict of interest.

# مقایسه تاثیر اجرای کد ۲۴۷ بر عملکرد کارکنان اورژانس مرکز آموزشی درمانی بوعلی سینای قزوین در برخورد با مبتلایان به سکته حاد قلبی در ساعات اداری و غیراداری سال ۱۳۹۶

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## چکیده

**زمینه** بیمارستان‌ها می‌توانند نتایج درمان در بیماران سکته حاد قلبی را با راهکارهای مختلف، به منظور کاهش زمان برقراری مجدد جریان خون در کرونر مبتلا، ارتقا بخشند.

**هدف** هدف این مطالعه، مقایسه تأثیر طراحی و اجرای کد ۲۴۷ در ساعات اداری و غیراداری بر عملکرد کارکنان اورژانس در بیماران سکته حاد قلبی بود.

**مواد و روش‌ها** این مطالعه نیمه‌تجربی در سال ۱۳۹۶ در بیمارستان بوعلی سینای قزوین انجام شد. ۵۸ بیمار که شرایط ورود داشتند با میانگین سنی ۱۲/۳±۵۸/۳ سال، با نمونه‌گیری دردسترس وارد مطالعه شدند و بر اساس دوره زمانی مراجعه، در دو گروه ۲۹نفره شاهد و آزمایش قرار گرفتند. در گروه شاهد، بیماران طبق روتین مدیریت شدند. در گروه آزمایش، ابتدا کد شش‌نفره ۲۴۷ در اورژانس طراحی شد. سپس در صورت انتقال بیمار با درد قلبی، اعضای کد با سیستم پیج برای رساندن هرچه سریع‌تر بیمار به کت‌لب فراخوان می‌شدند. پژوهشگر در هر دو گروه از درِ بیمارستان تا کت‌لب، زمان گرفتن نوار قلب، تشخیص و انتقال را مستقیماً مشاهده و ثبت کرد. داده‌ها با آزمون‌های آماری مجذور کای و من ویتنی تجزیه و تحلیل شدند.

**یافته‌ها** میانگین زمان از درب تا کت‌لب در گروه شاهد ۸۷/۴ دقیقه و در گروه آزمایش ۶۳/۷ دقیقه بود. مقایسه زمان‌ها در دو گروه از نظر آماری معنی‌دار شد (P=۰/۰۴). همچنین بین زمان درب تا کت‌لب، در ساعات اداری بین دو گروه تفاوت معنی‌داری مشاهده شد (P=۰/۰۲).

**نتیجه‌گیری** این مطالعه نشان داد اجرای کد ۲۴۷ باعث بهبود عملکرد کارکنان اورژانس در بیماران مبتلا به سکته قلبی حاد می‌شود.

**کلیدواژه‌ها:**
کد ۲۴۷، سکته قلبی حاد، بخش اورژانس

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